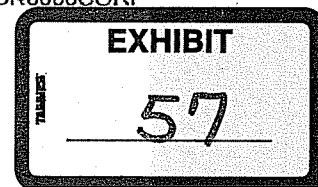


## Environmental Poultry Farm Management

4:05-cv-00329  
State's Exhibit 0353



TSN0060CORP



## **TABLE OF CONTENTS**

### **ENVIRONMENTAL POULTRY FARM MANAGEMENT**

#### **1. INTRODUCTION**

#### **2. POULTRY FARM ENVIRONMENTAL MANAGEMENT**

#### **3. FEDERAL REGULATIONS**

#### **4. STATE REGULATIONS**

#### **5. NUTRIENT MANAGEMENT**

#### **6. SOIL AND LITTER SAMPLING**

#### **7. RECORDKEEPING**

#### **8. BEST MANAGEMENT PRACTICES**

#### **9. LITTER STORAGE STRUCTURES**

#### **10. MORTALITY MANAGEMENT**

#### **11. PRODUCER RESOURCE AGENCIES**

#### **12. REFERENCES**

# INTRODUCTION

TSN0062CORP

## INTRODUCTION

Tyson has been in the poultry business for almost 70 years. Over this time, the company has become one of the most recognized brands for quality chicken products. We contract with approximately 7,000 independent contract poultry producers (producers) in 19 states that raise the birds that go into our products. Growing chickens for Tyson is a source of income for family farms that would otherwise have to depend only on the financial ups and downs of other crops. We are enabling people to remain on the family farm who might otherwise be forced off by economic pressures.

Tyson has a long-standing commitment to protecting the environment wherever we have operations. Tyson's commitment to the environment also extends to encouraging independent producers to be good stewards of the land that they depend on for their living. Tyson strongly recommends that producers implement conservation measures such as Nutrient Management Plans and Best Management Practices.

The following manual is designed to provide information to producers about recommended environmental farm management practices. Tyson requires its producers to comply with all applicable federal, state and local laws, rules, regulations, and ordinances including, but not limited to, all those governing environmental and poultry litter management. The producer makes the daily decisions that determine environmental quality and compliance with applicable requirements. Because the producer is responsible for on-farm environmental issues such as bird mortality and litter management, Tyson provides this guide for reference. This information is provided to encourage the producer to be a good steward of the land and to protect natural resources.

CONFIDENTIAL

# POULTRY FARM ENVIRONMENTAL MANAGEMENT

TSN0064CORP

## **POULTRY FARM ENVIRONMENTAL MANAGEMENT**

Tyson remains committed to protecting natural resources wherever it has operations. This commitment applies to our processing plants, hatcheries, feed mills and company owned and operated farms. Tyson also encourages producers to meet and even exceed governmental regulations concerning poultry production. Federal and state governments have adopted or in the process of updating regulations regarding poultry farms. These new regulations on poultry farms are much more restrictive than regulations in the past.

The following recommendations outline activities necessary for compliance with state and federal environmental regulations and also necessary for demonstrating a commitment to environmental stewardship. If a producer is subject to any federal, state or local regulation, those environmental regulations take precedence over these recommendations and must be complied with.

### **Nutrient Management Plan**

EPA and state regulations now require all Concentrated Animal Feeding Operations or CAFOs to maintain a Nutrient Management Plan (NMP) for on-farm litter handling and land application practices. The new EPA regulations require that litter application rates be based primarily on phosphorous concentration in the litter and phosphorous nutrient needs of the application area crops or grasses. Furthermore, states may develop new regulations that will require a NMP for farms that are not defined as CAFOs (see federal regulation section for CAFO definition).

Tyson strongly recommends that all producers maintain a NMP at the farm and for all land application areas owned or under their control. Upon request, personnel at the local office of the Natural Resources Conservation Service (NRCS) can prepare a NMP for producers. Also, representatives from the local Soil & Water Conservation District, Cooperative Extension Service or similar agency may have the authority to prepare a NMP. To meet the demand of producer requests for a NMP, several states are developing certification programs to enable private individuals or third parties to prepare NMPs for poultry producers.

The NMP should be updated whenever there has been a significant change in the operation. The state in which the farm is located may have specific requirements to determine when the NMP is to be updated. Producers need to be aware of these requirements and use established guidelines when considering changes to population numbers, Best Management Practices (BMP), litter handling and litter application practices. Producers should meet with the local NRCS, the agency or person that developed the NMP to prepare the five year update. Between the five year updates, producers should review the details of their NMP at least once per year.

### Soil Samples

EPA's recent regulations require all CAFOs to collect and analyze soils from all litter application fields at least once every five years. State permit programs can require more frequent sampling. Producers must maintain awareness of state requirements. For more information on soil sampling, please see section 6.

### Litter Samples

The regulations recently adopted by EPA require all CAFOs to collect and analyze a portion of their litter to be land applied. EPA states that annual sampling is the minimum frequency to provide litter nutrient concentration that can be used to establish a proper application rate. For more information on litter sampling, please see section 6.

### Litter Application

It is recommended that litter be land applied immediately after its removal from the poultry houses. The preferred method of storage is a covered stack storage structure. Any litter stockpiled should be covered in a manner to prevent contact with precipitation. The bottom or base of the storage structure should be constructed of either concrete or impermeable clay. Temporary field stacks may be allowed, but these should be configured in a manner to prevent any contact with precipitation and run-off.

Buffer zones and vegetated filter strips should be implemented and maintained in all application areas. Actual buffer zones details or distances will vary by state. The producer's NMP should contain a detailed list of all buffer zone distance requirements. Many state or county governmental environmental agencies may have additional guidelines for producers to adopt. Further information is usually available at the local NRCS office or at the county Cooperative Extension Service office.

Producers should maintain litter application records detailing the volume, application rate, the acreage covered and the date of all litter applications. Poultry litter should only be applied on fields listed in the NMP. Producers should always record the location of land application sites or fields that receive litter. The permitting agency may require producers to maintain these records at their farm. Records should be available for review and be retained for a minimum of five years or on the frequency determined by the permitting agency.

### Sale or Transfer of Dry Poultry Litter

For the sale or transfer of dry litter from the poultry farm to another person, the producer should supply the recipient with a copy of the most recent litter analysis. The producer should also maintain records of all sales or transfers of litter. These records should include the amount of litter that leaves the poultry farm, the date of the transfer or sale, and the name and address of the recipient and location of the application site. The producer should contact the permitting agency to determine if there are any regulations concerning litter transfers prior to removing litter.

### Training

Producers should attend annual training programs on nutrient management, which Tyson will coordinate with the Natural Resources Conservation Service or a similar agency in your area. In most states, the local Cooperative Extension service has developed informational pamphlets that can help producers better manage litter application. The information includes Best Management Practices to be utilized for the most economical and practical use of their litter.

### Mortality Management

Federal, state, and county dead bird disposal regulations are becoming more prevalent. Tyson encourages producers to minimize the impact of dead bird disposal through the utilization of Best Management Practices for the protection of the environment. It is the producer's responsibility to obtain information on the regulatory requirements to manage bird mortality and a possible catastrophic die-off. Producers should refer to section 10 for additional information.

# FEDERAL REGULATIONS

TSN0068CORP

## FEDERAL REGULATIONS

On April 14, 2003, the US Environmental Protection Agency updated and revised the requirements for Concentrated Animal Feeding Operations (CAFOs) under the Clean Water Act. CAFOs will now be required to obtain a permit for continued operations. EPA's regulations went into effect on April 14, 2003.

The final regulations are posted at: <http://cfpub.epa.gov/npdes/afo/cafofinalrule.cfm>.

Additionally, EPA has published a document "Producers Compliance Guide for CAFOs". This document is posted at: <http://cfpub.epa.gov/npdes/afo/compliance.cfm>.

### CAFO Definitions

The April 2003 regulations have been updated to incorporate many of the most recent advances in poultry production. EPA is now defining dry litter poultry farms with more than 125,000 broilers or 82,000 laying hens as large CAFOs. Also, farms that house more than 30,000 laying hens or broilers and utilize a liquid manure system will also be considered large CAFOs.

EPA has established a second category to define medium CAFOs. EPA has developed a two part definition to help a producer determine if their farm is a medium sized CAFO.

For a farm to be classified as a medium CAFO, both of the following must apply:

The bird population housed at the dry litter farm ranges between 37,500 and 124,999 broilers and for laying hens, the range is between 25,000 to 81,999 birds;

and

the farm discharges pollutants into waters of the US through a man-made device or pollutants are discharged directly into waters of the US which originate outside of and pass through the farm or come into direct contact with the birds.

The new EPA regulations also developed a third category to define a CAFO. The definition states that any animal production facility, regardless of its size, can be designated as a CAFO by EPA or a designated permitting authority.

Usually, farms that are designated as a CAFO have been determined to be a significant contributor of pollutants to waters of the US. An inspection of the facility by EPA or permitting authority must be conducted prior to designation as a CAFO. Also, if the permitting agency determines that the farm's discharge contributes to an impairment of down stream waters, already impaired for that pollutant, the farm could be designated as a CAFO.

TSN0069CORP

### Clean Water Act

All CAFOs are subject to and required to comply with EPA's new Clean Water Act (CWA) regulations, including the requirement to obtain a permit. The following information is a summary of the permitting program and the final regulations. The new regulations will apply to both the animal production area and to land application areas.

A CAFO is defined by the CWA as being a "point source" for the purposes of the National Pollutant Discharge Elimination System (NPDES) program. Point sources are required to obtain NPDES permit coverage. EPA has been authorized by the CWA to implement the NPDES permit program. EPA has since delegated the implementation of the NPDES permit program to a majority of states.

The NPDES program is then usually implemented and enforced by each state's respective environmental agency. Delegated states usually have a general permit for similar type point sources, such as CAFOs, to seek NPDES permit coverage. In the states that are not designated, the regional EPA office will be the permitting agency for the new CAFO regulations.

The April 2003 regulations require each delegated state and regional EPA office to issue new or revised NPDES permits that include all of EPA's CAFO regulations. States cannot implement regulations that are less stringent than those adopted by EPA, but can implement requirements that are more stringent. EPA has given the delegated states until April 2004 to revise their permitting programs or until April 2005 to amend state statutes to conform to federal requirements. In delegated states, the permitting agency is required by EPA to have a permit program in place to allow CAFO owners to begin applying for permit coverage by April 14, 2004.

According to EPA regulations, existing dry litter farms with more than 125,000 broilers or more than 82,000 layers will have until April 14, 2006 to obtain a NPDES permit. This deadline represents the latest date that an operation can apply for permit coverage. State permitting agencies, though, can set a permit deadline which can be earlier than the April 2006 date. Once the CAFO receives a NPDES permit, it must be kept "current" until the CAFO is closed and all litter removed according to state or federal provisions.

### Permit Conditions

EPA's new regulations contain additional conditions that are to be incorporated in all state CAFO NPDES permits. These conditions include requirements that all CAFO's develop and implement a NMP, maintain on-farm records, manage the transfer of litter from the CAFO to other persons and submit an annual report. Because delegated states may issue more stringent regulations, all producers should contact their state permitting agency to obtain the most up-to-date information and to determine the specific details of the regulations. Those producers not in delegated states should contact the EPA regional office responsible for the state where the farm is located.

TSN0070CORP

According to EPA regulations, all CAFOs must develop and implement a nutrient management plan (NMP) by December 31, 2006. After this date, any new CAFO seeking permit coverage must have a NMP in place when the permit is issued. For additional information please see section 7.

Permitted CAFOs must maintain records of management practices for the previous five years. The records include documentation of practices at both the production and land application areas. These records are to be kept on-site and made available to EPA or the state permitting agency upon request. A full discussion of record-keeping requirements follows in section 5.

#### **New Source Poultry Operations**

The April 2003 regulations also include requirements for CAFOs that are constructed after April 14, 2003. EPA refers to this type of farm as a "New Source." The regulations apply to new farms that will be defined as CAFOs once constructed and bird placement occurs. EPA defines a "New Source" as a CAFO constructed where no other CAFO is located. Also, a "New Source" CAFO can be defined as one that totally replaces an existing CAFO or one that is substantially independent of an existing CAFO.

EPA's regulations require new farms with bird populations greater than the CAFO threshold to apply or request permit coverage at least 180 days before beginning operations. New Source CAFO owners should submit their permit coverage application to their permitting agency. Furthermore, EPA is requiring all "New Source" CAFOs to have a Nutrient Management Plan in place at the time the farm commences operations.

Prior to beginning construction, a "New Source" CAFO owner should contact their permitting agency to determine all applicable requirements. State permitting agencies can set permit application deadlines and require additional conditions that are more stringent than those developed by EPA.

#### **Expanding Poultry Operations**

Existing poultry farms that increase the number of birds at their farm are also addressed in EPA's new regulations. Generally, dry litter poultry farms constructing additional houses which will contain more birds than the CAFO threshold number are not typically considered "New Sources."

EPA uses the following criteria to determine how an expanding farm will be defined at the beginning of operations. The first criteria to consider is whether the permitting agency where the farm is located had a CAFO permit program in place prior to April 14, 2003. A permit program would include a definition to help producers know if their existing farm is a CAFO. This would also allow an owner considering expansion to determine if the increase in bird population results in the farm being defined as a

CAFO. Based on this information, the owner could then determine whether permit coverage is required.

Prior to April 14, 2003, most states did not have a permit program to determine if a dry litter poultry farm was a CAFO. Since EPA's new regulations became effective, many existing poultry farms are now defined as CAFOs. EPA realized it could be confusing to have two different regulations: one for newly defined CAFOs, and one for those dry litter poultry farms that expand to CAFO size. Therefore, EPA new regulations indicate that, if a poultry farm expands to CAFO size in a state that did not have a method to define a CAFO prior to April 2003, the farm would be treated as if it were a newly defined CAFO.

EPA is also allowing newly defined CAFOs, existing prior to April 14, 2003, to have up to April 2006 to seek permit coverage. EPA realized it was problematic to allow existing dry litter poultry CAFOs up to three years to apply for permit coverage, but require expanding farms to seek coverage within a shorter time period. Thus, EPA will allow both existing CAFOs and farms expanding above the CAFO threshold to seek permit coverage within the same time period.

Although EPA has provided revised regulations, the actual determination of applicable standards may still be difficult. Also, the state can set permit application deadlines and require additional conditions that are more stringent than those developed by EPA. Prior to beginning an expansion project, the farm owner should contact their permitting agency to determine all applicable requirements.

TSN0072CORP

# STATE REGULATIONS

TSN0073CORP

# NUTRIENT MANAGEMENT

TSN0074CORP

## NUTRIENT MANAGEMENT

Poultry production has become one of the major agricultural endeavors in the US. Poultry producing areas are generally located in those parts of the country that are not conducive to traditional row crop agriculture. Examples of these areas include Northwest Arkansas, Northeast Alabama, Georgia and several regions within North Carolina, Virginia and Maryland. In some of these areas large scale poultry production has taken place since the early 1960's. The main use of poultry litter (poultry manure and bedding material) nutrients has been as a fertilizer for application to field crops and pasture grasses. The litter also provides organic material and serves as a soil amendment. This contrasts to commercial fertilizer that only provides nutrients when it is applied. While the litter has a proven fertilizer value; like any fertilizer, its use also presents the risk of over application.

Over the years, higher phosphorus levels have been noted in some application area soils. Excess phosphorous can be eroded from the soil and washed into nearby waterways. Higher concentrations of phosphorous in surface waters can result in creation of algal blooms. Poultry producers must utilize proper litter nutrient management practices to prevent nutrients from accumulating in soils. The two major nutrients found in poultry litter, nitrogen and phosphorous are essential crop nutrients but can present a risk to the environment if not managed responsibly. A discussion of these nutrients as well as information on nutrient management plans follows.

### Nitrogen

Most of the nitrogen in fresh poultry manure is in the organic and urea forms. Once excreted, the organic nitrogen can be converted into ammonium, ammonia or nitrate forms by bacterial action or processes. These forms are then readily available for plant uptake. The urea nitrogen readily converts to ammonium and ammonia. The ammonium can also be transformed into nitrate nitrogen by bacterial action. Nitrate can then migrate through the soils and accumulate in groundwater. High levels of nitrate in drinking water can be harmful to human health, especially infants.

After land application, more bacteria and organisms are available in the soils to convert much of the remaining organic and urea nitrogen to ammonium nitrogen. The ammonium nitrogen also undergoes several phase changes. A portion is available for plant uptake, a second portion will volatilize directly to the atmosphere and a third portion will convert to nitrite and nitrate as a result of bacterial actions.

### Phosphorous

Poultry manure has a high concentration of phosphorous when compared to the concentration of nitrogen. The phosphorous requirements of most plants are less than the nitrogen requirements. If application rates are calculated to meet the nitrogen nutrient requirements of most crops and pasture grasses, it is possible to land apply more phosphorus than is needed. Excess soil phosphorous could then be removed by runoff and transported to water sources.

Phosphorous in excreted poultry manure can be divided into two forms or types. The majority is excreted as organic phosphorous. The next largest concentration of phosphorous is the dissolved form. Within the poultry production house, the two phosphorous forms in the manure and organic bedding material together are referred to as "litter," and undergo little change. When litter is land applied, several phosphorous form changes will occur. Organic phosphorous can convert to soluble or dissolved phosphorous. The organic phosphorous can also convert to the attached form as soil particles are encountered. The soluble phosphorous form is readily available for plant uptake. Excess amounts of soluble phosphorous are also easily incorporated into precipitation and could leave the litter application area.

The attached form can result from the interaction between the phosphorous and minerals or particles in the soil. The phosphorous readily attaches to and forms strong bonds with trace minerals such as iron, aluminum and calcium present in the soil. Once these compounds are established, the phosphorous tends to remain bound to the soil particle and is usually not available for plant uptake.

#### **Land Application**

Land application is the most common and beneficial method to utilize the nutrients in poultry litter. Land application is relatively inexpensive and is environmentally beneficial when properly managed. The nutrients and organic material found in the litter provide a natural soil amendment. The litter can be used as a fertilizer that will provide valuable nutrients to increase the producer's grass or crop yields. By doing so, producers can benefit the environment by reducing the amount of commercial, inorganic fertilizers used at their farms. The litter is often viewed as commodity or a "bonus" by the producer. The litter can be used as an organic fertilizer or sold to neighboring land owners.

#### **Poultry Nutrient Management**

Many poultry producers apply litter as fertilizer to their pastures or croplands. To maximize the fertilizer benefits of the litter, producers should develop land application plans. Ideally, this should be completed before their litter is actually removed from the poultry house. Proper litter management incorporates the litter's nutrient content with the nutritional requirements of the crops in the application field. Comprehensive planning prior to litter application reduces the potential loss or waste of valuable nutrients. Nutrient management also minimizes adverse impacts that can result from over-application.

Poultry litter will lose a significant portion of its nitrogen compounds once it has been land applied. Soil incorporation shortly after litter application greatly reduces nutrient loss and reduces the potential for adverse impacts. Application of poultry litter to soils which are frozen or snow covered is usually prohibited. Litter application is normally not allowed during flood events or during times of high water table levels. The producer's nutrient management plan will likely include specific information for locations and times when litter is not to be land applied. Additionally, permitting agencies may have adopted setbacks distances or buffer zones for land application. Setbacks or buffers are specific distances from application sites to items such as water

sources, private dwellings, public roads and property lines. The state permitting agency should be contacted to determine all setback distances and buffer zones prior to application of litter.

#### **Nutrient Management Plan Development**

The Nutrient Management Plan (NMP) is an effective tool to both protect water quality and provide the producer with economic returns from poultry litter. To develop a NMP, the certified planner should first determine the nutrient requirements of the crop or pasture land to receive poultry litter. This should then be compared to the nutrient concentration of the litter. With this, the producer can determine the volume of litter that can be applied to meet crop needs.

Proper application rates provide adequate nutrients and also reduce potential water quality impacts due to nutrient run-off. Nutrient management plans calculate the total number of acres needed for land application of litter generated each year by the producer. This will allow the producer to then determine if the farm has sufficient application acres available or if a portion of the litter will need to be sold or transferred. Those landowners receiving or purchasing litter should also obtain a NMP for their land application acreage.

The Natural Resources Conservation Service (NRCS) has revised its technical guide, Conservation Practice Standard (Code 590) Nutrient Management, to include three methods that can be used to determine phosphorus application rates. Each method allows litter application rates to be based on nitrogen plant requirements. If the soil phosphorous levels are above an established level or concentration; however, nitrogen based application rates cannot be used. Instead, a phosphorous transport assessment or risk analysis is used to determine future litter application rates. Areas with soil that tests high for phosphorous or those sites with high risk factors for phosphorous run-off will likely have reduced litter application rates. The state NRCS offices are incorporating the federal guidance to develop state-specific guidance to determine phosphorous application rates. A copy of this conservation practice standard can be obtained at the local NRCS office or on the NRCS web-site: <http://www.nrcs.usda.gov/>.

The Phosphorus Index (PI) is one of the three methods listed in Technical Guide 590. This Index identifies and ranks litter application areas based on the risk of phosphorus movement. The Index considers factors or characteristics such as soil erosion rate, runoff, phosphorus soil test levels, commercial fertilizer and organic phosphorus application rates. The Index then incorporates these factors to assess the degree of vulnerability of phosphorus movement.

Producers should contact their local NRCS office or approved technical provider to request that a NMP be developed for proposed land application areas. Also, in some states, a certified technical service provider, certified crop advisor or licensed engineer may be available to prepare a NMP. Once the NMP has been implemented, it is recommended that producers review and update the plan for accuracy at least once every five years or on a frequency determined by the permitting agency. The NMP contains site-specific nutrient management plans for all application areas owned or under the control of the producer. Topographic maps and aerial photographs delineate all application sites. NRCS soil survey information of the application site's soil is included. Soil and litter sample analysis results are also included. Litter application rates are based on projected crop or forage yields. Buffer zones and setbacks will usually be marked on the topographic map and

aerial photographs. A list of Best Management Practices to be implemented at the farm is also part of the NMP.

Producers can also contact their permitting agency to determine if additional requirements or guidelines should be implemented. The producer's local office of the Cooperative Extension Service can provide beneficial information on a wide range of subjects concerning day-to-day operations. All producers should obtain a Nutrient Management Plan that will match litter application rates to meet plant nutritional requirements. Technical assistance and financial aid is available to help producers manage poultry litter applications. The NRCS and Cooperative Extension Service are two producer support agencies that can provide assistance.

# SOIL AND LITTER SAMPLING

TSN0079CORP

## **SOIL SAMPLING**

Determining the nutrient concentration of a soil is a primary step for planning a litter Nutrient Management Plan (NMP). Soil sampling provides the producer with detailed information to determine if a particular soil is deficient of nutrients or whether over application is possible. Monitoring soils for phosphorous is a major responsibility for all poultry producers that utilize litter as a fertilizer or soil amendment. EPA regulations now require large poultry farms to analyze all land application soils for phosphorous. All litter application fields should ideally be sampled at least once every three years or on a frequency determined by the permitting agency.

### **Sampling Laboratory**

Each state's Cooperative Extension Service will usually offer a soil testing program to producers. Depending on the state, the analysis could be performed at no charge. For other states, the Extension Service soil test charges may range from \$10 to \$20 per sample. The price will vary due to the number of parameters or items that are to be analyzed. Private testing laboratories can also be used.

The local county Extension Office or private lab should be contacted for information on how to collect a soil sample as well as analysis options. The Cooperative Extension Office can usually provide sampling instructions, information sheets and sampling bags or boxes. A basic soil analysis will test for several different items such as soil pH, nitrogen, phosphorous, potassium, calcium, magnesium, sodium, iron and conductivity.

### **Collecting Soil Samples**

Properly collecting a sample is critical to ensuring that the analysis accurately reflects the nutritional and mineral value of the particular soil. Contact the local Cooperative Extension office or sampling laboratory prior to collecting soil for information on specific techniques required by the testing facility.

### **Sampling Time**

The time of year that a sample is taken can produce different results. Soil nutrient concentrations vary due to the influences of rainfall, temperature and crop uptake. Producers should take soils samples at the same time of the year so the results are much easier to compare.

### **Soil Test Results**

The laboratory that completed the analysis can usually provide written information and consultation to explain the results of the soil tests. Producers should contact the local Cooperative Extension Office for additional information and materials. Each state may have specific testing procedures that are different than neighboring states. Producers should make sure that any soil references used are specifically written for their state.

## **POULTRY LITTER SAMPLING**

Determining the nutrient level of poultry litter is a primary component for the planner developing a nutrient management plan. Sampling provides detailed information on the nutrient concentration in the litter. A certified nutrient planner can then determine application rates to maximize crop uptake and prevent water quality impacts. Monitoring litter for phosphorous and nitrogen continues to be a major responsibility for all poultry producers. EPA regulations require CAFOs to analyze their litter for phosphorous and nitrogen each year. Also, producers need to be aware that their permitting agency can adopt regulations that require litter sampling more frequently. All sampling results are to be kept at the farm for five years. EPA regulations require CAFOs to give a copy of the litter nutrient analysis report to those individuals who purchase or are given litter from the farm.

### **Sampling Laboratory**

The local Cooperative Extension Service is usually available to conduct analysis of poultry litter. Private testing laboratories can also be used. It is recommended that producers contact the sampling laboratory prior to actually collecting the sample. The sampling laboratory will usually provide information on how to collect the sample and other helpful information.

At a minimum, the litter should be sampled for nitrogen, phosphorous, and potassium. Most Cooperative Extension offices include the above elements and can also include calcium, pH, percent moisture and electrical conductivity in the analysis.

### **Sample Collection**

The samples that provide the most accurate results are those of litter removed directly from the poultry house. Samples taken from stacking sheds or from compost bins will not contain the same nutrient concentrations. Regardless of the sampling location, the collected sample should be representative of the litter land applied. Properly collecting a sample is critical to ensuring that the analysis accurately reflects the nutritional and mineral value of the litter. Contact the local Cooperative Extension office or sampling laboratory prior to collecting litter for specific techniques required by the testing facility.

### **Sample Time**

Most publications indicate that litter should be analyzed prior to land application. The nutrient concentration of the manure will allow the certified nutrient planner to accurately calculate litter application rates. The sampling results should be used to prepare and periodically update the Nutrient Management Plan. Cake litter samples should also be taken and analyzed prior to removal and application. Most publications also state that producers should deliver their litter samples to the testing laboratory as soon as possible.

### **Litter Test Results**

The laboratory that completed the analysis can provide written information and consultation to explain the results of the litter tests. The sampling results usually include recommendations to further maximize nutrient usage. Producers should contact the local Cooperative Extension Office for additional information and materials. Each state may have specific testing procedures that are different than neighboring states. Producers should make sure that any litter references used are specifically written for the state in which the farm is located.

# RECORDKEEPING

TSN0083CORP

## **RECORDKEEPING**

The following section applies to poultry farms that have obtained a NPDES permit or are required to maintain certain records. Both the EPA and state agencies have record keeping requirements. States can develop more stringent recordkeeping requirements than those of EPA and can require any size farm to maintain records. Producers should contact their respective permitting agency to determine their recordkeeping responsibilities. Regardless of government regulations, producers should develop a recordkeeping program for their facility. Many of the items listed below will assist poultry producers with litter usage and improve the operation and management of their farms.

### **Record-keeping Requirements**

Permitted facilities will usually be required to maintain records of management practices for the previous five years. When requested, these records are to be made available to the permitting agency upon request. The records can include documentation of practices at both the production and the land application areas.

Production area records include information on the owner or operator of the farm, where it is located, the number and type of birds confined, available land application acres and the amount of litter generated, and the amount transferred each year. Also, the farm should maintain a topographic map that illustrates its location by latitude and longitude. Records for land application areas include litter application practices, conservation measures, the NMP and BMPs. The amount of litter land applied and transferred from the farm should also be recorded. Permitting agencies may also require operators to develop litter and soil sampling programs.

Examples of additional record keeping requirements for production and land application areas are detailed below.

### **Best Management Practices**

Farms should maintain records concerning BMPs that are utilized at land application areas. One essential BMP that must be documented is the development and implementation of a NMP for all land application areas. Additionally, records should include BMPs required by the permitting agency. These practices can include ensuring adequate storage of poultry litter, proper mortality management, onsite chemical management, developing litter testing procedures and land application management.

Another BMP required by EPA is the use of setbacks and vegetated buffers around surface waters. No litter is to be land applied in these areas. EPA has established a setback distance of 100' and as an alternative, vegetated buffer distance of 35' around surface waters. The states are allowed to require the development of additional buffers and setbacks.

### **Nutrient Management Plan**

The majority of the BMPs required by EPA can be satisfied through the development and implementation of a NMP. EPA also requires that a specific set of records concerning the management of land application activities be maintained at the farm. This list includes: (1) records of expected yields from application field crops; (2) date and method of land application; (3) weather conditions 24 hours before and after land application; (4) sampling methods for litter and soil analysis; (5) litter and soil test results; (6) litter application rates; and, (7) the actual amount of nitrogen and phosphorous applied.

### **Inspection Program**

It is suggested that inspections be performed on daily and weekly intervals of the production areas of the farm. It is recommended that the producer conduct weekly inspections of any storm water diversion devices around the production area and record the results of the inspection. Additionally, the producer should conduct daily inspections of all drinking water and cooling water lines and record the results.

The producer should perform a weekly inspection of any litter storage structures. The results of the inspection should be documented. Records documenting the current design of any litter storage structure are also to be maintained at the facility. Further, farms are encouraged to develop a program to periodically inspect all land application equipment. The equipment should be in good working order. The date of each inspection should be documented. Corrective actions arising from all inspections are to be recorded and maintained on-site for five years. All deficiencies should be corrected as soon as possible.

### **Litter Transfers**

EPA's new regulations will allow the transfer of litter from a poultry farm to other persons. The producer, however, must provide the recipient of the litter with a copy of the most recent nutrient analysis before transfer. Farm owners or operators must also record the date of litter transfer, name and address of the recipient and the approximate volume of litter transferred. Also, the location of the land application area must be documented.

### **Annual Report**

The permitted facility is required to submit an annual report to the permitting agency that includes the following:

- the number and type of birds in the production houses;
- an estimate of total litter generated by the birds;
- the amount of litter transferred to other persons in the previous 12 months;
- a description of any discharge that occurred on the farm;

- the total number of land application acres listed in the NMP;
- the actual number of acres used for land application in the previous 12 months;
- the total number of the land application acres owned or controlled by the farm; and,
- a statement indicating if the current NMP was developed or approved by a certified nutrient management planner.

TSN0086CORP

# BEST MANAGEMENT PRACTICES

TSN0087CORP

## **BEST MANAGEMENT PRACTICES**

Best Management Practices (BMPs) are guidelines helpful to poultry producers in the day-to-day management of their farms. These practices can help to protect the environment and allow the producer to gain full value of the litter that is sold or land-applied. The permitting agency may have a list of Best Management Practices that producers are to implement. Also, adopting BMPs may be a condition for permit compliance. Best Management Practices address areas such as litter handling practices, filter strips, soil and litter testing and record keeping. The following is a discussion of different management practices that are designed for poultry producers.

The Delaware Department of Agriculture has developed an extensive list of BMPs that producers should review.

Their website address follows: [www.state.de.us/deptagri/nutrients/bmp.htm](http://www.state.de.us/deptagri/nutrients/bmp.htm)

### **Composting**

Composting can be used to biologically stabilize fresh litter and dead birds into a beneficial soil amendment. Composting also reduces odor and the presence of flies. The use of composting can reduce the volume of litter. This reduction in the quantity of litter reduces producer hauling and spreading expenses.

### **Field and Riparian Buffer Zones**

Buffer zones are vegetated strips that have been established at the edge of application sites. The buffer zones reduce erosion and any potential runoff of nutrients. The use of grass buffer strips or forest filter strips can protect water quality close to poultry farms and litter application fields. The vegetated strips act to filter and retain any excess nutrients from runoff. The buffers act to reduce the volume of nutrients from contacting nearby water sources.

Contact the local Natural Resources Conservation Service, Cooperative Extension Service, or other producer support agency for additional details.

### **Acceptable Best Management Practices**

The following is a listing of Best Management Practices developed by the Texas Agricultural Extension Service.

1. All litter stockpiled or retained on site shall:
  - a. be covered to prevent contact with precipitation;
  - b. be placed on impermeable clay or concrete to prevent infiltration; and,
  - c. be isolated from all run-off waters by dikes, terraces, berms, ditches or other structures.
2. Maintain grass filter or barrier strips between litter application fields and streams, lakes or other water sources.

3. Do not spread litter close to a water well, highway or neighboring property line.
4. Do not apply litter to land with excessive slope.
5. Soil test at least once every three years and maintain results.
6. Sample litter before application.
7. Cover trucks hauling litter more than one mile.
8. Do not apply litter to frozen or saturated soils or during rain or snowfall.
8. Do not apply litter to highly erodible lands.
9. Inform neighbors when you will be applying litter.
10. Apply litter early in the week. Avoid spreading on Fridays or during the weekend.
11. Maintain records:
  - a. where litter was applied;
  - b. application rate;
  - c. when litter was applied and to what crop or forage grass;
  - d. anyone who bought or was given litter; and
  - e. location where litter will be applied.

#### **Odor Control**

The following table lists Best Management Practices to control poultry farm odors.

**Poultry Farm Waste Management Odor Control Checklist:**

<u>Source</u>	<u>Cause</u>	<u>BMPs to Minimize Odor</u>
Farmstead	Poultry Production	Vegetative or wooded buffers Recommended best management practices Good judgment and common sense
Ventilation	Volatile gases Dust	Fan maintenance Efficient air movement
Indoor surfaces	Dust	Vacuum and washdown between flocks.
Feeders	Feed spillage	Design, operate and maintain feed system to minimize accumulation of decaying wastage. Clean up spillage on a routine basis.
Feed storage	Decomposition of accumulated feed residues	Reduce moisture accumulation within and around immediate perimeter of feed storage by ensuring drainage is away from site and/or providing adequate containment. Clean up spillage on a routine basis.
Litter storage and handling areas	Decomposition of accumulated manure	Remove spillage on a regular basis. Provide for adequate drainage around manure stockpiles. Inspect for and remove or break up accumulated waste in filter strips around stockpiles and manure handling area as needed.
Dead birds	Carcass decomposition	Proper disposition of carcasses
Incinerators	Incomplete combustion	Secondary stack burners
Dead bird disposal pits	Carcass decomposition	Cover carcasses Proper location/construction of burial pits Disposal pit covers tight fitting
Standing water around facilities	Improper drainage Microbial decomposition of organic matter	Grade and landscape such that water drains away from facilities.
Mud tracked onto public roads from farm access	Poorly maintained access roads	Farm access road maintenance

(From the North Carolina "Dry Litter Poultry Handbook")

# LITTER STORAGE STRUCTURES

TSN0091CORP

## **LITTER STORAGE STRUCTURES**

When poultry litter is removed from houses, it is not always possible to land apply immediately. Factors that delay litter application can include the time of the year, plant growing season, and inclement weather. Producers should store litter in areas that are not exposed to precipitation or contact runoff water. Proper storage will help to maintain the nutrient concentration of the litter and reduce the potential for water quality impacts.

### **Permanent Structures**

A roofed structure is a preferred method to store litter prior to application. The roof height should be sufficient to allow movement by stacking equipment and should provide protection from rain blowing into the structure. The roof eliminates the introduction of excessive moisture which can lead to a reduction of nutrients. Such structures should have their foundations constructed from concrete or impermeable clay. These measures eliminate possible runoff and leaching to ground and surface waters.

The Natural Resources Conservation Service (NRCS) and Cooperative Extension Service may have plans available for the construction of litter storage units. The NRCS also provides some cost sharing programs to the producers to help with construction expenses.

### **Temporary Structures**

Producers can use windrow or bunker type arrangements for temporary manure storage. The temporary structures should be covered to prevent contact with precipitation and with runoff waters. Plastic sheeting may be used as long as it is anchored against the wind. The storage area should be located on a higher area away from water sources. The producer should use berms to prevent runoff waters from contacting the litter. Filter strips should also be maintained around temporary structures to prevent nutrient runoff.

### **Preventing Fires in Storage Structure**

Producers should be aware that litter storage structures have the potential for spontaneous combustion. Most fires result from the mixing of wet litter with dry litter or buildup of methane gas. Litter storage fires can be prevented through good management practices. Several suggested guidelines follow:

- keep the litter dry and away from the end of the barn;
- do not mix the wet cake with dry litter;
- do not cover moist litter, allow it to dry;
- limit stack height to less than 5 feet; and,
- stack internal temperature should not exceed 180 degrees F.

# MORTALITY MANAGEMENT

TSN0093CORP

## **MORTALITY MANAGEMENT**

As a condition of contracting with Tyson, producers must properly manage mortality and dead bird disposal. Flock health can be jeopardized by diseases such as airsacculitis and gangrenous dermatitis if dead birds are not properly managed. Disposal methods can include rendering, composting, incineration, landfill and sometimes disposal pits. Regardless of the method used, producers should implement environmentally sound measures for dead bird disposal. If not properly disposed, dead birds can cause odor, water quality impacts, disease and insect and rodent problems.

Permitting agencies generally have regulations concerning disposal practices and methods. As a permit condition, producers may be required to implement an approved method of disposal. Producers should contact the permitting agency in the state where the farm is located for additional details concerning mortality management.

### **Rendering**

Rendering is an excellent method for dead bird disposal. Almost 100% of the bird can be converted into alternative uses. Rendering also removes the dead birds from the area thereby eliminating the potential for adverse environmental impacts.

One issue to note when considering rendering is the condition of the carcasses when they are delivered to the rendering facility. Most of these facilities have specific guidelines for dead birds. The carcasses should be stored in a freezer or in a similar manner that reduces the rate of carcass decomposition. If such a method is not available, producers are usually required by the rendering company to deliver the birds within 24 hours of death. Producers should obtain guidance from the rendering facility prior to transporting dead birds.

### **Composting**

Composting dead birds is another practical and economic method of disposal. This process allows for the dead birds, litter and other organic material to be mixed together. These items will then decompose into a product that can be used as a fertilizer or soil amendment. Depending on the producer's management practices, this process can be accomplished in just over one month.

To begin a compost operation, producers should first determine the size of the bins that are needed at the farm. The local Extension Office or NRCS offices usually have guidance publications to help producers determine the size of their compost facility. To determine bin dimensions, producers should consider their average mortality figures from previous years and also the size of the birds near the completion of the growing cycle. Regardless of the final size, it is important to note that at least two compost bins should be constructed. Two bins allow for a primary and secondary heating process and aeration of the material.

The bins are usually constructed of wood and are generally five feet in height. The volume of each bin should be sized on estimated farm mortality rates. The bins should also be sized to

allow easy access of compost-handling equipment. All compost buildings should be roofed to prevent precipitation from contacting the material. The roof should also be designed to prevent blowing rain from entering and contacting the compost piles. The floor of the unit should be made from concrete or similar material. The temperature of the compost material should be monitored in both the primary and secondary bins. Producers should purchase a thermometer whose probe will be able to reach the middle of the material stored in the bin. A thermometer up to three feet in length could be required depending on the size of the bin.

Moving the material from the first bin to the second allows mixing with the atmosphere. In the second bin, the material will go through a second heating process. The internal temperature of the material should again be monitored. As in the primary bin, the temperature in the second bin will spike and then begin to fall. The material should be removed from the second bin and placed inside a storage shed until final use. The material can be temporarily stored outside, but permitting agencies usually require the material be covered to prevent contact with both precipitation and runoff waters.

If the compost is to be land applied, the producer's Nutrient Management Plan should be updated to specify application rates and land application sites. The permitting agency should also be contacted to determine if any regulations exist to monitor or prohibit land application of compost.

#### Incineration

The use of incinerators is another method to dispose of dead birds. When propane or natural gas prices are low, the use of incinerators often increases. Fortunately, many of today's incineration units are highly efficient which offsets fuel price fluctuations.

Incinerators need to be carefully sited to reduce possible odor complaints. Poultry producers must address air quality issues such as odor and dust which can be generated by incineration. Further, a permit may be required for the operation of an incinerator. The producer should contact their permitting agency for regulatory advice associated with the use of an incinerator. Producers can contact a sales representative from one of the various incinerator manufacturers to help determine the appropriate size of the unit. Producers should consider their average mortality figures from previous years and also the size of the birds near the completion of the growing cycle. Poultry carcass mass does increase rather dramatically in the later weeks of the grow-out cycle and should be added to incinerator sizing calculations.

Incinerators are available with several different options. Producers should carefully review the various options to determine the unit that will best suit the farm. Units are available with single and dual burners. Others are available with automatic timers and ignition. These controls can reduce the amount of time needed to operate the incinerator, but additional preventative maintenance may be required to keep these units in working order.

The ash that results from incineration must be disposed of properly. There can be concentrations of phosphorous and potassium in the ash. Land application of the ash is allowed in

most states. Producers should consult their permitting agency to obtain information about requirements prior to any land application.

#### **Catastrophic Poultry Mortality Loss**

A catastrophic loss of poultry is something that could impact any producer regardless of management practices. Excessive mortalities could result from a loss of electricity on a hot summer afternoon, rainfall and wind from a hurricane, or tornado or an extremely heavy snowfall. While little can be done to prevent these tragedies, producers should develop a contingency plan to respond to such an event before it occurs.

The producer's permitting agency or Department of Agriculture should have in place a program to address catastrophic loss. The local office of the Extension Service or NRCS may have additional information and guidance. Most of these agencies also have specific disposal options that producers can utilize. Generally, these options include incineration, composting, rendering, landfill or on-farm burial. Most catastrophic disposal programs will require the producer to contact the appropriate agency to detail the reason for the loss and action taken to resolve the situation.

# PRODUCER RESOURCE AGENCIES

TSN0097CORP

## **PRODUCER RESOURCES**

### **U.S. Poultry and Egg Association**

- Dedicated to the growth of the entire poultry industry.
- Extensive programs allow members to remain informed of regulatory measures and technical advances made within the industry.
- U.S. Poultry and Egg Association  
1530 Cooledge Road  
Tucker, GA 30084  
TEL: (770) 493-9401  
FAX: (770) 493-9257

<http://www.poultryegg.org/>

### **Poultry Water Quality Consortium**

- Encourages the use of poultry and poultry by-products as a resource.
- Promotes cooperation and information exchanges between government and industry on water quality issues.
- Poultry Water Quality Consortium  
6100 Building Suite 4300  
5720 Uptain Road  
Chattanooga, TN 37411-5681  
TEL: (423) 855-6470

<http://www.poultryegg.org/PWQC/index.html>

### **U.S. Environmental Protection Agency**

#### **Animal Feeding Operations**

- Website developed for owners and operators of all types of animal feeding operations.
- Contains EPA regulations concerning all CAFOs.
- Contact: [http://cfpub1.epa.gov/npdes/home.cfm?program\\_id=7](http://cfpub1.epa.gov/npdes/home.cfm?program_id=7)

#### **Non-Point Source Pollution**

- Website provides producers with numerous publications and additional guidance material to manage runoff from agricultural activities.
- Contact: <http://www.epa.gov/owow/nps/agriculture.html>

#### **Natural Resources Conservation Service**

- Administers national soil and water conservation programs.
- Provides USDA leadership to assist landowners implementing resource conservation measures.
- Provides technical support to landowners considering items such as manure storage facilities, mortality disposal practices and nutrient management plans.
- Contact Washington, D.C. office: <http://www.nrcs.usda.gov/>
- Regional, state and local NRCS offices can usually be found in the local telephone directory or can be accessed at the following website:  
<http://www.nrcs.usda.gov/about/organization/regions.html>

#### **Cooperative Extension Service**

- Provides state specific research based information and technology to producers.
- Partnership with USDA and each states land grant university.
- Contact information is usually available in the local telephone directory.

## **DIRECTORY OF STATE AND NATIONAL POULTRY ASSOCIATIONS**

### **Alabama Poultry and Egg Association**

P. O. Box 240  
Montgomery, AL 36101  
TEL: (334) 265-APEA  
FAX: (334) 265-0008  
<http://www.alabamapoultry.org>

### **Arkansas Poultry Federation**

321 South Victory Street  
Little Rock, AR 72201  
TEL: (501) 375-8131  
<http://www.thepoultryfederation.com/>

### **Delmarva Poultry Industry, Inc (Delaware and Maryland)**

16686 County Seat Hwy.  
Georgetown, DE 19947-4881  
TEL: (302) 856-9037  
<http://www.dpichicken.org/>

### **Georgia Poultry Federation**

P.O. Box 763  
Oakwood, GA 30566  
TEL: (770) 532-0473  
FAX: (770) 532-7543

### **Indiana State Poultry Association**

Purdue University  
1151 Lilly Hall 1026  
West Lafayette, IN 47907-1151  
TEL: (765) 494-8517  
FAX: 765-496-1600  
<http://ag.ansc.purdue.edu/ispa/index.html>

### **Kentucky Poultry Federation**

P.O. Box 21829  
Lexington, KY 40522-1829  
TEL: (859) 266-8375  
FAX: (859) 269-1303  
[www.kypoultry.org](http://www.kypoultry.org)

**Louisiana Poultry Federation**

120 Ingram Hall  
Louisiana State University  
Baton Rouge, LA 70803  
TEL: (225) 578-2219  
FAX: (225) 578-1259

**Mississippi Poultry Association**

P.O. Box 13309  
Jackson, MS 39236-3309  
TEL: (601) 355-0248  
FAX: (601) 353-3840

**Missouri Poultry Federation**

225 E. Capitol Ave.  
Jefferson City, MO 65101  
TEL: (573) 761-5610  
<http://www.thepoultryfederation.com/>

**North Carolina Poultry Federation**

4020 Barrett Drive, Suite 102  
Raleigh, NC 27609  
TEL: (919) 783-8218  
<http://www.ncpoultry.org/>

**Oklahoma Poultry Federation**

14 North East 48th St.  
Oklahoma City, OK 73105  
TEL: (405) 604-3350  
<http://www.thepoultryfederation.com/>

**Pennsylvania (PennAG Industries Association)**

2215 Forest Hills Drive, Suite 39  
Harrisburg, PA 17112  
TEL: (717) 651-5920  
FAX: (717) 651-5926  
<http://www.pennag.com/>

**South Carolina Poultry Federation**

1921-A Pickens St.  
Columbia, SC  
TEL: (803) 779-4700  
FAX: (803) 779-5002

**Tennessee Egg and Poultry Association**

926 Scepter Drive  
Murfreesboro, TN 37129  
TEL: (615) 890-1272  
FAX: (615) 890-1272  
<http://www.tnpoultry.org/>

**Texas Poultry Federation**

595 Round Rock West Dr. 305  
Round Rock, Texas 78681  
TEL: (512) 248-0600  
FAX: (512) 248-0664  
<http://www.texaspoultry.org/>

**Virginia Poultry Federation**

333 Neff Ave., Suite C  
Harrisonburg, VA 22801-3430  
TEL: (540) 433-2451  
FAX: (540) 433-3256  
<http://www.vapoultry.com/>

**NATURAL RESOURCES CONSERVATION SERVICE**

**STATE OFFICES**

**Alabama NRCS Service Center Office**

P.O. Box 311  
Auburn, AL 36831-0311  
TEL: (334) 887-4500  
FAX (334) 887-4534

**Arkansas NRCS State Office**

State Office Complex  
Arkansas State Office  
700 W Capitol Ave Ste 3416  
Little Rock, AR 72201-3215  
TEL: (501) 301-3100

**Delaware NRCS State Office**

1203 College Park Dr Ste. 101  
Dover, DE 19904-8713  
TEL: (302) 678-4160

**Georgia NRCS State Office**

355 E Hancock Ave  
Athens, GA 30601-2775  
TEL: (706) 546-2272  
FAX: (706) 546-2120

**Illinois NRCS State Office**

2110 W Park Ct Suite A  
Champaign, IL 61821-2986  
TEL: (217) 353-6603  
FAX: (217) 353-6676

**Indiana NRCS State Office**

6013 Lakeside Blvd  
Indianapolis, IN 46278-1989  
TEL: (317) 290-3200

**Kentucky NRCS State Office**

771 Corporate Dr Suite 100  
Lexington, KY 40503-5438  
TEL: (859) 224-7350

**Louisiana NRCS State Office**  
3737 Government St  
Alexandria, LA 71302-3327  
TEL: (318) 473-7751

**Maryland NRCS State Office**  
339 Buschs Frontage Rd  
Annapolis, MD 21401-5596  
TEL: (410) 757-0681  
FAX: (410) 757-0687

**Mississippi NRCS State Office**  
100 W Capitol St Suite 1321  
Jackson, MS 39269-1602  
TEL: (601) 965-4182  
FAX: (601) 965-4940

**Missouri NRCS State Office**  
601 Business Loop 70 W Suite 250  
Columbia, MO 65203-2546  
TEL: (573) 876-0900

**North Carolina NRCS State Office**  
4405 Bland Rd Suite 205  
Raleigh, NC 27609-6293  
TEL: (919) 873-2118  
FAX: (919) 873-2190

**Oklahoma NRCS State Office**  
100 USDA Ste 206  
Stillwater, OK 74074-2651  
TEL: (405) 742-1204  
FAX: (405) 742-1201

**Pennsylvania NRCS State Office**  
1 Credit Union Place  
Harrisburg, PA 17110-2912  
TEL: (717) 237-2222

**South Carolina NRCS State Office**  
1835 Assembly St Suite 1007  
Columbia, SC 29201-2448  
TEL: (803) 765-5883

**Tennessee NRCS State Office**  
675 US Courthouse  
Nashville, TN 37203  
TEL: (615) 277-2577  
FAX: (615) 277-2531

**Texas NRCS State Office**  
101 S Main St  
Temple, TX 76501-7602  
TEL: (254) 742-9800  
FAX: (254) 742-9819 fax

**Virginia NRCS State Office**  
1606 Santa Rosa Rd.  
Richmond, VA 23229-5014  
TEL: (804) 287-1500

**West Virginia NRCS State Office**  
75 High St RM 301  
Morgantown, WV 26505-7558  
TEL: (304) 284-7548

## **COOPERATIVE EXTENSION SERVICE**

### **STATE OFFICE CONTACTS**

#### **Alabama Cooperative Extension:**

1) North Alabama District  
P.O. Box 1088  
Normal, AL 35762  
TEL: (256) 858-4975  
FAX: (256) 858-4976

2) East Alabama District  
224 Duncan Hall Annex  
Auburn University, AL 36849  
TEL: (334) 844-5270  
FAX: (334) 844-5276

3) South West Alabama  
800 Alabama Avenue  
Selma, AL 36701  
TEL: (334) 875-3232  
FAX: (334) 875-3234

#### **Arkansas Cooperative Extension Service**

University of Arkansas  
Division of Agriculture  
2301 South University Avenue  
Little Rock, Arkansas 72204  
TEL: (501) 671-2000  
FAX: (501) 671-2209

#### **Delaware Department of Agriculture**

2320 S. Du Pont Hwy  
Dover, DE 19901  
TEL: (302) 698-4500  
FAX: (302) 697-6287

#### **Georgia Cooperative Extension Service**

University of Georgia  
College of Agricultural & Environmental Sciences  
Conner Hall  
Athens, GA  
TEL: (706) 542-3924

#### **Illinois Extension and Outreach**

University of Illinois  
214 Mumford Hall (MC-710)  
1301 W. Gregory Dr.  
Urbana, IL 61801  
TEL: (217) 333-5900

**Indiana Cooperative Extension Service**

Purdue University  
Agricultural Administration Building  
615 W. State Street  
West Lafayette, IN 47907-2053  
TEL: (765) 494-8489  
FAX: (765) 494-45876

**Kentucky Cooperative Extension Service**

College of Agriculture  
University of Kentucky  
S-107 Ag. Science Bldg.-North  
Lexington, KY 40506  
TEL: (859) 257-4302

**Louisiana Cooperative Extension Service**

LSU Agricultural Center  
102 Efferson Hall  
Baton Rouge, LA 70803  
P.O. Box 25203  
Baton Rouge, LA 70894-5203  
TEL: (225) 578-6083

**Maryland Cooperative Extension Service:**

Eastern Shore  
Wye Research and Education Center  
P.O. Box 169  
124 Wye Narrows Drive  
Queenstown, MD 21658  
TEL: 410-827-8056

**Mississippi Cooperative Extension Service**

Department of Agriculture and Biological Engineering  
Box 9632  
Mississippi State, MS 39762  
TEL: (662) 325-3280  
FAX: (662) 325-3853

**Missouri Cooperative Extension:**

1) Central Missouri Region Office	2) Southwest Missouri Office
530 Clark Hall	3003 E. Chestnut Expressway, Suite 200
University of Missouri	Springfield, Missouri 65802
Columbia, MO 65211	TEL: (417) 865-0707
TEL: (573) 882-2695	

**North Carolina Cooperative Extension Service**

College of Agriculture and Life Sciences  
102 Ricks, Box 7602  
North Carolina State University  
Raleigh, NC 27695  
TEL: (919) 515-2811

**Oklahoma Cooperative Extension Service**

139 Agriculture Hall  
Oklahoma State University  
Stillwater, Oklahoma 74078  
TEL: (405) 744-5398  
FAX: (405) 744-5339

**Pennsylvania Cooperative Extension Service**

College of Agricultural Sciences  
217 Ag Admin  
Penn State University  
University Park, PA 16802  
TEL: (814) 863-3438

**South Carolina Cooperative Extension Service**

103 Barre Hall  
Clemson University  
Clemson, SC 29634-0101  
TEL: (864) 656-3382  
FAX (864) 656-5819

**Tennessee Cooperative Extension Service**

2621 Morgan Circle  
121 Morgan Hall  
Knoxville, Tennessee 37996  
TEL: (865) 974-7114  
FAX: 865-974-1068

**Texas Cooperative Extension Service**  
Williams Administration Bldg. Rm 112  
College Station, TX 77843-7101  
TEL: (979) 845-7800  
FAX: (979) 845-9542

**Virginia Cooperative Extension Service:**

1) Southeast Region  
Cooperative Extension Building  
First Floor  
Suite 107  
P.O. Box 9400  
Virginia State University  
Petersburg, VA 23806  
TEL: (804) 524-5252  
FAX: (804) 524-5452

2) Central Region  
P.O. Box 158  
History Junction Shopping Center  
Highway 460  
Appomattox, VA 24522-0158  
TEL: (434) 352-7114

3) Northwest Region  
1316 East Main St., Suite C  
Luray, VA 22835  
TEL: (540) 743-2009  
FAX: (540) 743-2014

4) Northern Region  
70 Main Street  
Suite 31  
PO Box 701  
Warrenton, VA 20188-0701  
TEL: (540) 341-7961  
FAX: (540) 347-2534

5) Northeast Region  
11 South 12th Street  
Suite 210  
Richmond, VA 23219-4035  
TEL: (804) 786-5802  
FAX: 804-786-5815

**West Virginia Cooperative Extension Service**  
507 Knapp Hall  
Morgantown, WV 26506-6031  
TEL: (304) 293-4221  
FAX: (304) 293-6611

#### PERMITTING AGENCY CONTACTS

**Alabama Department of Environmental Management**

1400 Coliseum Blvd.  
P.O. Box 301463  
Montgomery, AL 36130-1463  
TEL: (334) 271-7700

**Arkansas:**

**1) Department of Environmental Quality**

8001 National Drive  
P.O. Box 8913  
Little Rock, AR 72219  
TEL: (501) 682-0744

**2) Soil and Water Conservation Commission**

101 East Capitol, Suite 350  
Little Rock, Arkansas 72201  
TEL: (501) 682-1611  
FAX: (501) 682-3991

**Delaware Department of Agriculture**

2320 S. Du Pont Hwy  
Dover, DE 19901  
TEL: (302) 698-4500  
FAX: (302) 697-6287

**Georgia Environmental Protection Division**

2 Martin Luther King Jr. Drive  
Suite 1152 East Tower  
Atlanta, Georgia 30334  
TEL: (404) 657-5947  
TEL: (888) 373-5947  
FAX: (404) 651-5778

**Illinois Environmental Protection Agency**

Bureau of Water  
Watershed Management Section  
1021 N. Grand Avenue East  
Springfield, IL 62794-9276  
TEL: (217) 782-3362

**Indiana Department of Environmental Management**

100 N. Senate Ave  
P.O. Box 6015  
Indianapolis, IN 46206-6015  
TEL: (800) 451-6027

**Kentucky Natural Resources and Environmental Protection**

500 Mero Street 5th Floor, CPT  
Frankfort, KY 40601  
TEL: (502) 564-3350  
FAX: (502) 564-3354

**Louisiana Department of Environmental Quality**

P.O. Box 4313  
Baton Rouge, La. 70821-4313  
TEL: (225) 219-3296  
FAX: (225) 219-3309

**Maryland:**

**1) Department of the Environment**

1800 Washington Blvd.  
Baltimore, Maryland 21230  
TEL: (800) 633-6101

**2) Department of Agriculture**

50 Harry S. Truman Parkway  
Annapolis, MD  
TEL: (410) 841-5700

**Mississippi Department of Environmental Quality**

P.O. Box 10385  
Southport Center  
2380 Highway 80 West  
Jackson, MS 39204  
TEL: (960) 961-5171

**Missouri Department of Natural Resources**

P.O. Box 176  
Jefferson City, MO 65102  
TEL: (800) 361-4827

**North Carolina Department of Environment and Natural Resources**

1601 Mail Service Center  
Raleigh, NC 27699  
TEL: (919) 733-4984

TSN0111CORP

**Oklahoma:**

1) Department of Agriculture  
2800 N. Lincoln Blvd.  
Oklahoma City, OK 73105-4298  
TEL: (405) 521-3864

2) United States Environmental Protection Agency Region 6  
1445 Ross Avenue Suite 1200  
Dallas, TX 75202  
TEL: (214) 655-6548

**Pennsylvania Department of Environmental Protection**  
16th Floor, Rachel Carson State Office Building  
P.O. Box 2063  
Harrisburg, PA 17105-2063  
TEL: (717) 787-4686

**South Carolina Department of Health and Environmental Control**  
2600 Bull Street  
Columbia, SC 29201  
TEL: (803) 898-3432

**Tennessee Department of Environment and Conservation**  
401 Church Street, 21<sup>st</sup> Floor  
Nashville, TN 37243-0435  
(615) 532-0104

**Texas Commission on Environmental Quality**  
12100 Park 35 Circle  
P.O. Box 13087  
Austin, TX 78711-3087  
TEL: (512) 239-1000

**Virginia Department of Environmental Quality**  
629 East Main Street  
P.O. Box 10009  
Richmond, Virginia 23240-0009  
TEL: (800) 592-5482

**West Virginia Department of Environmental Protection**  
414 Summers Street  
Charleston, WV 25301  
TEL: (304) 558-2107

## REFERENCES

TSN0113CORP

## REFERENCES

- Arkansas Soil and Water Conservation Commission and the Water Resources Center, No Date, Composting: A safe and simple alternative in water quality and poultry disposal pits. Fact Sheet 2, Arkansas Soil and Water Conservation Commission, Little Rock, AR.
- Barker, J.C., 1990, Livestock waste sampling, analysis, and calculation of land application rates. Reprint. EBAE 11 1-84. Agricultural Extension Service, North Carolina State University, Raleigh, NC.
- Bell, D., 1982, Marketing poultry manure. University of California, Riverside, CA.
- Blake, J.P., 1993, Mortality Management Presentation; Poultry Waste Management and Water Quality Workshop. Southeastern Poultry and Egg Association, Atlanta, GA.
- , 1995, Rendering—A Disposal Method for Dead Birds. Publication ANR-923, Alabama Cooperative Extension System.
- Boles, J.C., Jr, Karl VanDevender, John Langston and Angela Rieck, 1994, Dry Poultry Litter Management. Publication MP 358, University of Arkansas Cooperative Extension Service, Little Rock, AR.
- Brandel, V.A., 1988, Soil phosphorous: managing it effectively. Fact Sheet 513, Cooperative Extension Service, University of Maryland, College Park, MD.
- Britton, J, Catastrophic Poultry Mortality Loss: Handling and Disposal Alternatives. Publication F 8216, Oklahoma Cooperative Extension Service, Division of Agricultural Sciences and Natural Resources, Oklahoma State University, Stillwater, OK.
- Brodie, H.L. and V.A. Bradel, 1990, Manure testing. Publication FS-430, Cooperative Extension Service, University of Maryland, College Park, MD.
- , L.E. Carr, and C.F. Miller, 1990, Structures for broiler litter manure storage. Fact Sheet 416, Cooperative Extension Service, University of Maryland, College Park, MD.
- Brown, W.R., 1993, Composting Poultry Manure. Presentation: Poultry Waste Management and Water Quality Workshop, Southeastern Poultry and Egg Association, Atlanta, GA.
- Burns, R.T., Using Incinerators for Poultry Mortality Management. Publication AWM-01-00. University of Tennessee, Agricultural Extension Service, Knoxville, TN.
- Cabe Associates, Inc., 1991, Poultry manure storage and process: alternative evaluation, Final Report. Project 100-286, University of Delaware Research and Education Center, Georgetown, DE.

- Carter, T.A., and R.E. Sneed, 1987, Drinking water quality for poultry. PS&T Guide No. 42. Cooperative Extension Service, North Carolina State University, Raleigh, NC.
- , K.E. Anderson, J.C. Barker, S.S. Brunton, D.V. Rives, S.E. Scheideler, S.M. Stringham, and M.J. Wineland, 1998, Composting Poultry Mortality. Poultry Science and Technology Guide #47. Extension Poultry Science, North Carolina State University, Raleigh, NC.
- Chapman, S.L. and W.H. Baker, Understanding the Numbers on Your Soil Test Report. Publication FSA 2118 University of Arkansas Cooperative Extension Service, Little Rock, AR.
- Cunningham, D.L., Casey W. Ritz and William C. Merka, 2003, Best Management Practices for Storing and Applying Poultry Litter. Bulletin 1230, Cooperative Extension Service The University of Georgia College of Agricultural and Environmental Sciences, Athens, GA.
- Daniels, Mike, John Langston, Stan Chapman, K.J. Combs, Karl VanDevender and John Jennings, Soil Testing for Manure Management. Publication FSA 1035, University of Arkansas Cooperative Extension Service, Little Rock, AR.
- Department of Natural Resources and Environmental Control, 1989, Poultry manure management: a supplement to Delaware guidelines. Cooperative Bulletin 24, Delaware Cooperative Extension, University of Delaware, Newark.
- Donald, J.O. and J.P. Blake, 1990, Economics of Transporting Poultry Litter as a Fertilizer. DTP Circular 10/90-007. Alabama Cooperative Extension Service, Auburn University, Auburn, AL.
- , 1990, Use and Construction of Poultry Burial Pits. DTP Circular 10/90-013, Alabama Cooperative Extension Service, Auburn University, Auburn, AL.
- , 1990, Installation and use of incinerators, DPT Circular 11/90-014. Alabama Cooperative Extension Service, Auburn University, Auburn, AL.
- and John P. Blake, 1996, Preventing Fires in Litter Storage Structures. Publication ANR-915, Alabama Cooperative Extension System, Auburn University, AL.
- , John P. Blake, Frank Wood, Kevan Tucker, and David Harkins, 1996, Broiler Litter Storage, Publication ANR-839, Alabama Cooperative Extension System, Auburn University, AL.
- Fulhage, C., 1989, Reduce environmental problems with proper land application of animal wastes. WQ201, University Extension, University of Missouri, Columbia, MO.

- , 1990, Reduce environmental problems with proper land application of animal waste. WQ201, Cooperative Extension Service, University of Missouri, Columbia, MO.
- , 1992, Reduce environmental problems with proper land application of animal wastes. WQ201, University Extension, University of Missouri, Columbia, MO.
- , 1992, Composting poultry carcasses in Missouri, WQ205. Cooperative Extension, University of Missouri, Columbia, MO.
- , 1992, Land application considerations for animal wastes. WQ202, University Extension, University of Missouri, Columbia, MO.
- Goan, H.C. and J. Jared, 1991, Poultry manure--proper handling and application to protect our water resources. PB 142 1, Cooperative Extension Service, University of Tennessee, Knoxville.
- Keeney, D.R. and R.F. Follett, 1991, Overview and introduction. Chapter 1, In Managing nitrogen for groundwater quality and farm profitability. Proceedings. Soil Science Society of America, Madison, WI.
- Kellogg, R.L. and Charles H. Lander, 1999, Trends in the Potential for Nutrient Loading from Confined Livestock Operations. Poster Presentation for "The State of North America's Private Land," Chicago, IL, <http://www.nrcs.usda.gov/technical/land/pubs/ntrend.html>.
- Killpack, S. and D. Bucholz, 199 1, What is nitrogen? WQ22 5 1. University Extension, University of Missouri, Columbia, MO.
- Lander, C.H., David Moffitt and Klaus Alt, 1998, Nutrients Available from Livestock Manure Relative to Crop Growth Requirements. U.S. Department of Agriculture, Natural Resources Conservation Service Resource Assessment and Strategic Planning Working Paper 98-1.
- Malone, G.W. and Dorothy Addott-Donnelly, 2001, The Benefits of Planting Trees Around Poultry Farms. Bulletin #159, Cooperative Extension Service, College of Agriculture and Natural Resources, University of Delaware, Georgetown, DE.
- Margette, W.L. and R.A. Weismiller, 1991, Nutrient management for waste quality protection. Bay Fact Sheet 3, Cooperative Extension Service, University of Maryland, College Park, MD.
- Marsh, Lori, Greg Mullins, Scott Ambler, Rick Heidel, 2003, Manure Spreader Calibration for Rear-discharge Equipment Handling Solid and Semi-solid Manures and Poultry Litter. Publication 442-004, Virginia Cooperative Extension, Virginia Polytechnic Institute and State University, Blacksburg, VA.

- Missouri Department of Natural Resources, 1993, Obtaining a DNR Letter of Approval For a Livestock Waste Management System. WQ217, University Extension, University of Missouri, Columbia, MO.
- Mitchell, C.C. and T.W. Tyson, 2001, Calibrating Poultry Litter Spreaders. Publication ANR-889, Alabama Cooperative Extension System, Auburn University, Auburn, AL.
- Murphy, D.W. and Carr, L.E., 1991, rev. Composting Dead Birds. Fact Sheet 537, Cooperative Extension, University of Maryland, College Park, MD.
- Ogburn, C.B. and J.O. Donald, 1990, Calibrating Spreaders for the Application of Animal and Poultry Manure. DPT Circular 11/90-006. Cooperative Extension Service, Auburn University, Auburn, AL.
- Plank, C.O., 2000, Soil Testing. Leaflet 99, Cooperative Extension Service, College of Agricultural and Environmental Sciences, University of Georgia, Athens, GA.
- Poultry Water Quality Handbook. 1994, Poultry Water Quality Consortium, HB-2C, 1101 Market Street, Chattanooga, TN 37402-2801.
- Strohmeier, K., Water Quality Protection Tips. Kentucky Cooperative Extension Publication, Owen County, KY.
- Swanson M.H., No Date, Some reflections on dried poultry waste. University of California Cooperative Extension, Riverside, CA.
- U.S. Department of Agriculture, 1991, Improving and protecting water quality in Georgia ... one drop at a time. Soil Conservation Service, Athens, GA.
- , 1992, National Engineering Handbook 210, Part 651. In Agriculture Waste Management Field Handbook, Soil Conservation Service, Washington DC.
- U.S. Environmental Protection Agency, 1993, The Watershed Protection Approach: A Project Focus. draft, Assessment and Watershed Protection Division, Washington, DC.
- Walker, F., On-Farm Composting of Poultry Litter. Agricultural Extension Service, University of Tennessee, Knoxville, TN.
- VanDevender, K. and Gary Huitink, Calibrating Poultry Litter Spreader Trucks. FSA 1040, University of Arkansas Cooperative Extension Service, Little Rock, AR.
- Wells, K.L., G.W. Thomas, J.L. Sims, and M.S. Smith, 1991, Managing soil nitrates for agronomic efficiency and environmental protection. AGR-147. Cooperative Extension Service, University of Kentucky, Lexington, KY.

Wineland, M.J. and Carter, T.A., 1987, Poultry science and technology guide—proper disposal of dead poultry. PS&T Guide No. 19, North Carolina Agricultural Extension Service, Raleigh, NC.

Woodward, M., No Date, Manure spreader calibration worksheet. Technical Note #4, Cooperative Extension Service, Pennsylvania State University, Lancaster, PA.

Zimmerman, M., 1993, Freezing for the rendering plant. Presentation, Poultry Waste Management and Water Quality Workshop, Southeastern Poultry and Egg Association, Atlanta, GA.

Zublana, J., 1993, Land applications: nutrient management plan. Presentation, Poultry Waste Management and Water Quality Workshop, Southeastern Poultry and Egg Association, Atlanta, GA.

Zublana, J.P., Barker, J.C., and Carter, T.A., 1993, Soil facts: poultry manure as a fertilizer source, AG-43905. WQWM-439-41. North Carolina Cooperative Extension Service, Raleigh, NC.